

MARHAB

Improving marine habitat status by considering ecosystem dynamics

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Executive Summary
Modiolus BRUV Studies Two attempts were made to locate sizable <i>Modiolus</i> aggregations and conduct dedicated BRUV studies to assess fish communities and mobile invertebrate fauna associated with these reef-forming organisms. A previously undescribed, sizable <i>Modiolus</i> aggregation in Øresund was identified and mapped. Subsequently, a BRUV study was carried out on both the aggregation sites and control sites. Video footage was analyzed to retrieve maxN values for each species. The BRUV surveys were conducted in both May and August. A second attempt near Tipperne in Kattegat did not succeed in finding aggregations large enough to support a BRUV study. Only sporadic clumps of <i>Modiolus</i> were observed here. The next step will be to estimate <i>Modiolus</i> densities at the study sites based on the dropdown camera footage from the aggregations. We will then test for species-specific differences in average maxN as well as overall species richness between <i>Modiolus</i> sites and control sites. The data will be made openly available as part of D3.4. Results will be a scientific publication under D3.6. As highlighted in the systematic literature review (D3.1), there are almost no existing studies describing fish communities associated with <i>Modiolus</i> habitats. This BRUV study will therefore represent a significant contribution to the field. Mytilus BRUV study Data from an earlier BRUV study on a large <i>Mytilus</i> aggregation in southern Denmark has already been analyzed and published, and are therefore not included in this delivery report (Yoo, C., Wilms, T. J., Stoehr, S. A., Latuta, L., Timmermann, K., Moltesen, M., & Svendsen, J. C. (2024).

Mussel reefs promote taxonomic biodiversity and host a unique assemblage of mobile marine fauna in a coastal area of poor ecological status. Journal of Sea Research, 202, 102544.)

Later integration into Policy Brief in D3.7

The datasets and studies mentioned above, together with the data from D3.1, the results from WP2 on *Modiolus* genetics, and D3.2/D3.3-extra_material “Current status of protection of sand banks and mussel and oyster biogenic reefs in the Natura2000 network”, will collectively support the development of the Policy Brief in D3.7.

Document history		
Version	Date	Description
V1	18.12.2025	First version

List of acronyms	
Acronym	Meaning

On 28 April 2025, an area Northwest of the island Ven in the Sound at 17-26 m depth was scanned using Side Scan Sonar. The coverage was 100% with transects going both from West to East and from North to South. The extent of the reef was around 500 x 100 meters with several clusters on aphotic mud. In addition to the Side Scan Sonar, there were made 7 transects of 10 minutes duration with a drop camera while the boat drifted at a speed of 0.5 knots. 5 BRUVs (Baited remote underwater video) were set in the area with a duration of 55-65 minutes and different settings of light and weight.

After determining the existence and location of the horse mussel reef, two surveys were completed using BRUVs in 4 different locations and 3 control areas. Two locations with a high concentration of *Modiolus* were surveyed and two locations with a medium concentration. A control location north of the reef and two south of the reef were added for comparison.

All BRUVs were baited with 4 freshly thawed herrings, each cut up in 3 pieces. The BRUVs were calibrated before the surveys, but the extra control had one uncalibrated camera due to the old camera drowning. So, all other videos could be used for fish measurements. 2 lights were attached to each BRUV, and the batteries were changed between each set. The BRUVs were left in the water for at least 65 minutes and then hauled onto the boat using the net-hauler. An oxygen-logger was attached to one BRUV at a time on the last two survey days. All areas were thus represented.

The first survey was between 05-05-2025 and 09-05-2025 and the 7 BRUVs were set 6 times with a duration of at least 1 hour.

Date	Start time	Latitude N	Longitude E	Area
05-05-2025	12_00	55_55_051	012_37_601	high_konc
05-05-2025	12_05	55_55_620	012_37_627	high_konc
05-05-2025	12_15	55_55_940	012_37_317	med_konc
05-05-2025	12_20	55_55_940	012_37_319	med_konc
05-05-2025	12_30	55_54_932	012_37_666	south_control
05-05-2025	12_35	55_54_932	012_37_668	south_control
05-05-2025	12_45	55_55_162	012_37_652	north_control
07-05-2025	09_05	55_55_055	012_37_604	high_konc1

07-05-2025	09_18	55_55_088	012_37_307	med_konc20
07-05-2025	09_26	55_55_290	012_37_390	med_konc21
07-05-2025	09_40	55_55_065	012_37_788	high_konc2
07-05-2025	09_50	55_55_195	012_37_662	north_control
07-05-2025	10_00	55_54_930	012_37_660	south_control
07-05-2025	10_10	55_54_942	012_37_380	extra_control
07-05-2025	10_50	55_55_064	012_37_621	high_konc1
07-05-2025	11_02	55_55_094	012_37_316	med_konc20
07-05-2025	11_10	55_55_027	012_37_392	med_konc21
07-05-2025	11_18	55_55_056	012_37_797	high_konc2
07-05-2025	11_30	55_55_172	012_37_662	north_control
07-05-2025	11_40	55_54_905	012_37_709	south_control
07-05-2025	11_53	55_54_924	012_37_389	extra_control
08-05-2025	09_10	55_55_050	012_37_614	high_konc1
08-05-2025	09_25	55_55_089	012_37_308	med_konc20
08-05-2025	09_30	55_55_028	012_37_394	med_konc21
08-05-2025	09_38	55_55_600	012_37_797	high_konc2
08-05-2025	09_50	55_54_934	012_37_357	extra_control
08-05-2025	09_58	55_54_918	012_37_710	south_control
08-05-2025	10_07	55_55_177	012_37_645	north_control
08-05-2025	10_50	55_55_050	012_37_589	high_konc1
08-05-2025	11_03	55_55_087	012_37_311	med_konc20
08-05-2025	11_16	55_55_270	012_37_370	med_konc21
08-05-2025	11_27	55_55_054	012_37_776	high_konc2
08-05-2025	11_45	55_54_918	012_37_708	south_control
08-05-2025	11_52	55_55_170	012_37_662	north_control
09-05-2025	09_11	55_55_062	012_37_612	high_konc1
09-05-2025	09_19	55_55_090	012_37_308	med_konc20
09-05-2025	09_25	55_55_028	012_37_397	med_konc21
09-05-2025	09_32	55_55_060	012_37_786	high_konc2
09-05-2025	09_38	55_55_198	012_37_669	north_control
09-05-2025	09_44	55_54_917	012_37_684	south_control

The second survey was completed in the period from 25-08-2025 to 29-08-2025 with the same set up. The 7 BRUVs were set a total of 9 times with a duration of at least 1 hour per set.

Date	Start time	Latitude N	Longitude E	Area	End time
25-08-2025	11_08	55_55_094	012_37_311	med_konc20	12_37
25-08-2025	11_22	55_55_021	012_37_392	med_konc21	12_46
25-08-2025	11_31	55_55_078	012_37_613	high_konc1	12_50
25-08-2025	11_41	55_55_057	012_37_796	high_konc2	13_00
25-08-2025	11_51	55_55_162	012_37_652	north_control	13_10
25-08-2025	12_02	55_54_900	012_37_712	south_control	13_18

25-08-2025	12_12	55_54_951	012_37_391	extra_control	13_24
26-08-2025	09_13	55_55_057	012_37_771	high_konc2	10_50
26-08-2025	09_26	55_55_073	012_37_592	high_konc1	11_00
26-08-2025	09_35	55_55_096	012_37_319	med_konc20	11_10
26-08-2025	09_43	55_55_030	012_37_389	med_konc21	11_19
26-08-2025	09_51	55_54_946	012_37_612	south_control	11_26
26-08-2025	09_58	55_54_954	012_37_387	extra_control	11_35
26-08-2025	10_05	55_55_164	012_37_648	north_control	11_42
26-08-2025	10_57	55_55_059	012_37_764	high_konc2	13_04
26-08-2025	11_06	55_55_062	012_37_583	high_konc1	13_10
26-08-2025	11_15	55_55_100	012_37_309	med_konc20	13_16
26-08-2025	11_23	55_55_027	012_37_383	med_konc21	13_21
26-08-2025	11_32	55_54_930	012_37_647	south_control	13_36
26-08-2025	10_40	55_54_951	012_37_390	extra_control	13_29
26-08-2025	11_46	55_55_170	012_37_649	north_control	13_41
27-08-2025	10_08	55_55_100	012_37_315	med_konc20	11_48
27-08-2025	10_29	55_55_035	012_37_389	med_konc21	11_55
27-08-2025	10_34	55_54_954	012_37_401	extra_control	12_04
27-08-2025	10_50	55_54_909	012_37_675	south_control	12_17
27-08-2025	10_55	55_55_081	012_37_592	high_konc1	12_25
27-08-2025	11_00	55_55_065	012_37_778	high_konc2	12_33
27-08-2025	11_05	55_55_177	012_37_640	north_control	12_44
27-08-2025	11_51	55_55_101	012_37_304	med_konc20	13_22
27-08-2025	12_00	55_55_031	012_37_390	med_konc21	13_28
27-08-2025	12_10	55_54_947	012_37_364	extra_control	13_34
27-08-2025	12_21	55_54_907	012_37_664	south_control	13_44
27-08-2025	12_29	55_55_078	012_37_577	high_konc1	13_50
27-08-2025	12_37	55_55_063	012_37_775	high_konc2	13_56
27-08-2025	12_48	55_55_166	012_37_636	north_control	14_03
28-08-2025	09_40	55_55_103	012_37_311	med_konc20	11_12
28-08-2025	09_47	55_55_026	012_37_391	med_konc21	11_20
28-08-2025	09_53	55_54_954	012_37_367	extra_control	11_26
28-08-2025	09_58	55_54_909	012_37_697	south_control	11_32
28-08-2025	10_06	55_55_080	012_37_579	high_konc1	11_40
28-08-2025	10_10	55_55_065	012_37_788	high_konc2	11_45
28-08-2025	10_15	55_55_176	012_37_631	north_control	11_55
28-08-2025	11_16	55_55_102	012_37_323	med_konc20	12_47
28-08-2025	11_24	55_55_033	012_37_398	med_konc21	12_52
28-08-2025	11_36	55_54_929	012_37_699	south_control	13_00
28-08-2025	11_43	55_55_050	012_37_596	high_konc1	13_07
28-08-2025	11_50	55_55_056	012_37_782	high_konc2	13_16
28-08-2025	11_57	55_55_166	012_37_636	north_control	13_23
28-08-2025	12_01	55_54_945	012_37_378	extra_control	13_30
29-08-2025	09_27	55_55_100	012_37_311	med_konc20	10_58
29-08-2025	09_32	55_55_033	012_37_400	med_konc21	11_05

29-08-2025	09_36	55_54_958	012_37_397	extra_control	11_09
29-08-2025	09_42	55_54_912	012_37_688	south_control	11_16
29-08-2025	09_46	55_55_076	012_37_612	high_konc1	11_23
29-08-2025	09_51	55_55_061	012_37_790	high_konc2	11_34
29-08-2025	09_55	55_55_169	012_37_649	north_control	11_40
29-08-2025	11_02	55_55_097	012_37_304	med_konc20	12_30
29-08-2025	11_08	55_55_035	012_37_405	med_konc21	12_36
29-08-2025	11_13	55_54_946	012_37_386	extra_control	12_39
29-08-2025	11_20	55_54_907	012_37_706	south_control	12_43
29-08-2025	11_30	55_55_092	012_37_588	high_konc1	12_48
29-08-2025	11_37	55_55_055	012_37_801	high_konc2	12_52
29-08-2025	11_44	55_55_172	012_37_628	north_control	12_57

All videos were analyzed in SEAGIS Event Measure, where maxN was recorded for each fish species. Also, large mobile invertebrate fauna was included. Seven species of fish were observed and five groups of invertebrates. The most abundant species was whiting (*Merlangius merlangius*) with an average maxN of 5.8 in high modiolus concentration sites, 5.5 in medium concentration sites and 3.5 in control areas with bare mud bottom.

The next step will be to estimate Modiolus densities at the different study sites and test for species-specific differences in average maxN as well as species richness between modiolus sites and control sites.

The data will be made open access as part of D3.4.